CLAIMS

What is claimed is:

1. In a wireless network environment comprising a plurality of access elements and at least one wireless node, wherein the wireless node is operative to transmit wireless frames on a plurality of operating channels to discover access points with which to connect, a method for refreshing signal information in a wireless node location mechanism, comprising

    receiving a request to estimate the location of a wireless node connected to a wireless network;

    terminating the connection between the wireless node and the wireless network;

    collecting signal strength values, detected at a plurality of radio receivers, corresponding to signals transmitted by the wireless node; and

    computing the estimated location of the wireless node based at least in part on the signal strength values detected by the plurality of radio receivers.

2. The method of claim 1 wherein the computing step comprises

    providing the collected signal strength values to a wireless node location model that returns an estimated location for the wireless node.

3. The method of claim 2 wherein the wireless node location model triangulates the estimated location of the wireless node based on the collected signal strength values and the locations of the plurality of radio receivers.

4. The method of claim 1 wherein the wireless network comprises at least one access point.

6561/53797

5. The method of claim 4 wherein at least one of the radio receivers is an access point in the wireless network.

6. The method of claim 1 wherein at least one of the radio receivers is an access point in the wireless network.

7. The method of claim 1 further comprising wait

waiting a period of time, after termination of the connection between the wireless network and the wireless node, before computing the estimated location of the wireless node.

8. The method of claim 1 wherein the computing step comprises

identifying the radio receivers associated with the signal strengths to be used in locating the wireless node;

selecting aspects of an RF physical model associated with the identified radio receivers; and

computing the estimated location of the wireless node using the signal strengths of the signals detected by the identified radio receivers, and the selected aspects of the physical model.

9. The method of claim 8 wherein the aspects of the RF physical model are coverage maps corresponding to respective radio receivers.

10. The method of claim 9 wherein the coverage maps each comprise a plurality of location coordinates associated with corresponding signal strength values.

11. The method of claim 10 wherein the coverage maps are heuristically constructed.

6561/53797

12. The method of claim 10 wherein the coverage maps are based on a mathematical model.

13. The method of claim 1 wherein the wireless node implements the 802.11 protocol.

14. The method of claim 1 wherein the at least one wireless node and the radio receivers are capable of operating in more than one radio frequency band, and wherein the location of the wireless node is computed based on the signal strength values detected by the radio receivers and the radio frequency band associated with the signal strength values.

15. The method of claim 14 wherein the computing step comprises
    identifying the radio receivers associated with the signal strengths to be used in locating the wireless node;
    selecting aspects of an RF physical model associated with the identified radio receivers and the radio frequency band on which the signal strengths were detected by the radio receivers; and
    computing the estimated location of the wireless node using the signal strengths of the signals detected by the identified radio receivers, and the selected aspects of the physical model.

16. The method of claim 15 wherein the aspects of the RF physical model are coverage maps corresponding to respective radio receivers.

17. The method of claim 16 wherein the coverage maps each comprise a plurality of location coordinates associated with corresponding signal strength values.

18. The method of claim 17 wherein the coverage maps are heuristically constructed.

19. The method of claim 17 wherein the coverage maps are based on a mathematical model.

20. In a wireless network environment comprising a plurality of access elements and at least one wireless node, wherein the wireless node is operative to transmit wireless frames on a plurality of operating channels to discover access points with which to connect, wherein the access elements are operative to transmit responses to the wireless node, a method for refreshing signal information in a wireless node location mechanism, comprising

receiving a request to estimate the location of a wireless node connected to a wireless network;

terminating the connection between the wireless node and the wireless network;

collecting signal strength values of signals transmitted between a plurality of radio receivers and the wireless node; and

computing the estimated location of the wireless node based at least in part on the collected signal strength values.

21. The method of claim 20 wherein the collecting step is performed at the wireless node.

22. The method of claim 20 wherein signal strength values are measured at the access elements.

23. The method of claim 20 wherein the computing step comprises

31

6561/53797

providing the collected signal strength values to a wireless node location model that returns an estimated location for the wireless node.

24. The method of claim 23 wherein the wireless node location model triangulates the estimated location of the wireless node based on the collected signal strength values and the locations of the plurality of radio receivers.

25. The method of claim 20 wherein the wireless network comprises at least one access point.

26. The method of claim 20 further comprising wait

waiting a period of time, after termination of the connection between the wireless network and the wireless node, before computing the estimated location of the wireless node.

27. The method of claim 20 wherein the computing step comprises

identifying the radio receivers associated with the signal strengths to be used in locating the wireless node;

selecting aspects of an RF physical model associated with the identified radio receivers; and

computing the estimated location of the wireless node using the signal strengths of the signals detected by the identified radio receivers, and the selected aspects of the physical model.

28. The method of claim 27 wherein the aspects of the RF physical model are coverage maps corresponding to respective radio receivers.

29. The method of claim 28 wherein the coverage maps each comprise a plurality of location coordinates associated with corresponding signal strength values.

6561/53797

30. The method of claim 29 wherein the coverage maps are heuristically constructed.

31. The method of claim 29 wherein the coverage maps are based on a mathematical model.

32. The method of claim 20 wherein the wireless node implements the 802.11 protocol.

33. An apparatus facilitating the location of a wireless node connected to a wireless network, wherein the wireless node is operative to transmit wireless frames on a plurality of operating channels to discover access points with which to connect, comprising

      a plurality of radio receivers comprising at least one antenna, the plurality of radio receivers operative to detect the strength of signals transmitted by wireless nodes and provide the detected signal strengths to a wireless node location module; and

      a wireless node location module operative

          selectively terminate the connection between the wireless node and the wireless network;

          collect signal strength values, detected at a plurality of radio receivers, corresponding to signals transmitted by the wireless node; and

          compute the estimated location of the wireless node based at least in part on the signal strength values detected by the plurality of radio receivers.

34. The apparatus of claim 33 wherein the wireless node location module is further operative to wait a period of time, after termination of the connection between the

wireless node and the wireless network, before computing the estimated location of the wireless node.

35. An apparatus facilitating the location of a wireless node connected to a wireless network, wherein the wireless node is operative to transmit wireless frames on a plurality of operating channels to discover access points with which to connect, comprising

a communication module operative to interact with a plurality of radio receivers comprising at least one antenna, the plurality of radio receivers operative to detect the strength of signals transmitted by wireless nodes and provide the detected signal strengths to a wireless node location module; and

a wireless node location module operative

selectively terminate the connection between the wireless node and the wireless network;

collect signal strength values, detected at a plurality of radio receivers, corresponding to signals transmitted by the wireless node; and

compute the estimated location of the wireless node based at least in part on the signal strength values detected by the plurality of radio receivers.

36. The apparatus of claim 35 wherein·the communication module comprises a network interface adapter.

37. A wireless network system facilitating the location of a wireless node, wherein the wireless node is operative to transmit wireless frames on a plurality of operating channels to discover access points with which to connect, comprising

a plurality of access elements for wireless communication with at least one remote client element and for communication with a central control element; wherein a RF coverage map, corresponding to each of the access elements, characterizes the signal strength values for locations in a physical region,

34

wherein the access elements are each operative to

establish and maintain, in connection with a central control element, wireless connections with remote client elements;

detect the strength of received signals;

append a signal strength value to frames received from wireless nodes; and

transmit received frames to a central control element;

at least one central control element for supervising the access elements, wherein the central control element is operative to

manage wireless connections between the access elements and corresponding remote client elements, and

store signal strength data appended to frames transmitted by the plurality of access elements in association with wireless node identifiers; and

a wireless node location module operative to

selectively terminate the connection between a wireless node and an access element;

compute the estimated location of the wireless node based at least in part on the signal strength values detected by the plurality of access elements.

38. The system of claim 37 wherein the wireless node location module is further operative to wait a period of time, after termination of the connection between the wireless node and the access element, before computing the estimated location of the wireless node.

39. The system of claim 37 wherein the wireless node location module resides in a network management system.

40. The system of claim 37 wherein the wireless node location module resides in the central control element.

6561/53797

41. The system of claim 37 wherein the wireless node location module maintains a signal strength matrix including values representing the strength of signals detected between the access elements.

42. The system of claim 37 wherein the frames are 802.11 frames.

43. The system of claim 38 wherein the wireless node identifiers are MAC addresses.